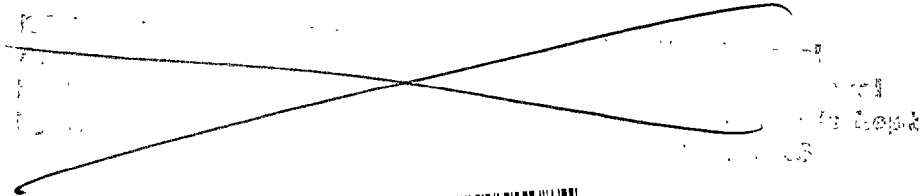




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**REPORT TO THE JOINT COMMITTEE  
ON ATOMIC ENERGY  
CONGRESS OF THE UNITED STATES**



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RELEASED

**Proposed Revisions To The Criteria  
And Contracts For Uranium  
Enrichment Services** B-159687

Atomic Energy Commission

**BY THE COMPTROLLER GENERAL  
OF THE UNITED STATES**

MARCH 5, 1973

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COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

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(1)  
The Honorable Melvin Price, Chairman  
Joint Committee on Atomic Energy  
Congress of the United States

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Dear Mr. Chairman:

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This is our report on the Atomic Energy Commission's proposed revisions to the criteria and contracts for uranium enrichment services. The report was prepared in accordance with a request dated January 26, 1973, by the Chairman, Joint Committee on Atomic Energy. 743

A copy of this report is being sent to the Vice Chairman of your Committee. As your Committee agreed, copies of the report are being sent to the Chairman, Atomic Energy Commission. Comments of the Commission have been considered in finalizing the report.

We do not plan to further distribute the report unless the Committee agrees or publicly announces its contents.

Sincerely yours,

Comptroller General  
of the United States

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## ABBREVIATIONS

AEC	Atomic Energy Commission
AIF	Atomic Industrial Forum
CIP	Cascade Improvement Program
CUP	Cascade Upgrading Program
GAO	General Accounting Office
MWE	Megawatts electrical
U-235	uranium-235

GLOSSARY OF  
URANIUM ENRICHMENT

TERMINOLOGY

Assay	the percent of the U-235 isotope in a given quantity of uranium; for example, uranium found in nature has an assay of 0.711 percent U-235.
Cascade Improvement Program and Cascade Upgrading Program (CIP and CUP)	programs to increase the productive capability of the existing gaseous diffusion plants by about 62 percent.
Depleted uranium	refers to that uranium whose U-235 assay is below that level found in nature.
Enriched uranium	refers to that uranium whose U-235 assay is above that level found in nature; for example, enriched uranium with an assay of about 3 percent is generally used as fuel for nuclear power reactors.
Firm up	means to specify uranium requirements in terms of quantities, assay, and delivery dates.
Gas centrifuge	a process for enriching uranium currently under development.
Gaseous diffusion	a process used in the existing AEC plants to produce enriched uranium.
Isotope	one atomic species of an element which has a specific mass.

Separative work

the work devoted to separating a quantity of uranium (feed material), into two fractions--one a product fraction containing a higher concentration of the isotope U-235 than the feed and the other a tails fraction containing a lower concentration of U-235.

Tails

depleted uranium produced as a byproduct of uranium enrichment process.

U-235

one of the two principal isotopes of uranium found in nature making up about 0.711 percent of the element's weight. The other principal isotope is U-238.

REPORT TO THE  
JOINT COMMITTEE ON ATOMIC ENERGY  
CONGRESS OF THE UNITED STATES

PROPOSED REVISIONS TO THE CRITERIA  
AND CONTRACTS FOR URANIUM  
ENRICHMENT SERVICES  
Atomic Energy Commission B-159687

D I G E S T

WHY THE REVIEW WAS MADE

On January 26, 1973, the Joint Committee on Atomic Energy asked the General Accounting Office (GAO) to review the Atomic Energy Commission's (AEC's) proposed revisions to the Uranium Enrichment Services Criteria. (See app. I.) A glossary of uranium enrichment terminology follows the table of contents.

Background

The proposed revisions would change the terms and conditions under which AEC currently offers to provide enrichment services by requiring its customers to assume a greater share of the financial risks in supplying such services.

The Government and industry generally agree that additional enrichment capability will be needed to meet the future demand for enrichment services. There are uncertainties, however, as to

--when the demand will exceed the supply and

--who the enricher will be--the Government or industry. (See p. 7.)

The objectives of AEC's proposed revisions are to help remove these uncertainties by (1) firming up the future demand for enrichment services and (2) facilitating the entrance of industry into the uranium enrichment services business.

AEC informed GAO that it had not discussed the proposed revisions to the criteria and contracts with industry. Because of the time limitations for reporting to the Committee, GAO was unable to discuss the impact of AEC's proposed changes with industry.

FINDINGS AND CONCLUSIONS

AEC's major changes to its uranium enrichment services criteria provide for:

- Eliminating references to existing contracts and establishing more general terms and conditions.
- Eliminating the restriction on AEC to offer enrichment services within available capability.
- Eliminating the ceiling charge for enrichment services.
- Establishing a provision permitting AEC to charge more than one price for enrichment services.
- Eliminating the 180-day notice for the effective date for future price increases. (See p. 13.)

AEC expects that the operating practices to be implemented as a result of these changes--discussed below in detail--will help to remove some of the uncertainty surrounding the future demand for enrichment services. In turn these changes will provide a

more realistic basis on which to (1) identify the demand on the existing diffusion plants and (2) plan for the development of new enrichment capability. AEC believes that it should offer enrichment services under conditions which more nearly approach those likely to exist in industry and which would help industry enter the enrichment services business. (See p. 13.)

GAO sees no legal objection to the proposed criteria changes and the corresponding changes AEC is contemplating in its contractual relationship with its customers. AEC's objectives in changing the criteria seem reasonable because of the uncertainties as to the level of future customer demand for enrichment services and the substantial commitments necessary to provide additional enrichment capability.

GAO believes that the proposed changes provide AEC with the flexibility to initiate operating practices which should be helpful in accomplishing its objectives. In the final analysis AEC's ability to fully accomplish its objectives will depend on future events which cannot be predicted. (See p. 26.)

Eliminating references  
to existing contracts

AEC is proposing to stop using requirements contracts and has developed the features of a new fixed-commitment contract. Under requirements contracts, AEC agrees to provide the enrichment services for a stated nuclear power reactor on an "as needed" basis up to a definite limit for as long as 30 years. (See p. 13.)

When this contract approach was adopted, there was an excess of Gov-

vernment capability to provide enrichment services and AEC believed that this type of contract would help encourage the development of the nuclear industry. AEC now believes that the nuclear industry should share substantially more of the risks in contracting for enrichment services. (See p. 15.)

Four principal differences between requirements contracts and the proposed fixed-commitment contracts are:

1. Delivery leadtime--Under requirements contracts a customer could place his order between 120 and 180 days before delivery. Under fixed-commitment contracts a customer must place his order 8 years before his initial delivery and 10 years in advance for subsequent deliveries.
2. Downpayment--Under requirements contracts no downpayment was required. Under fixed-commitment contracts the downpayment will depend on the size of the reactor and will be approximately \$3.3 million per 1,000 megawatts of electricity.
3. Termination provisions--Under fixed-commitment contracts, the termination charges will be more costly to the customer than those provided for under requirements contracts. (See p. 17.)
4. Charge for separative work--Under the requirements contracts the charge for separative work will be \$38.50 a unit, and under the fixed-commitment contracts AEC is proposing to charge \$36 a unit.

All customers holding requirements contracts will be given an option to convert to the fixed-commitment contracts. However, these customers cannot be required to convert.



AEC also plans to offer a short-term fixed-commitment contract (which can cover enrichment needs over a maximum of 3 years) to those customers who do not wish to enter into long-term contracts. (See p. 18.)

Contracting beyond available capability

The existing criteria provide that AEC will offer enrichment services "subject to available capability." This language has been deleted from the proposed criteria. This deletion would permit AEC to enter into contracts for uranium enrichment services in excess of the capability of AEC's diffusion plants, including the additional capability to result from plant improvements and from operating the plants at full power. (See p. 18.)

Because of the changes AEC is proposing to make in its contracts for providing uranium enrichment services, AEC expects to be near its capability limit by the end of calendar year 1974. AEC stated that it did not, however, anticipate that it would have a need to contract in excess of its capability. (See p. 19.)

AEC told GAO that it believed that industry could be in a position by the end of 1974 to assume responsibility for providing any additional enrichment capability needed and that all contracts beyond AEC's capability would be consummated between the private enricher and the customer. (See p. 20.) However, AEC informed GAO that it had not discussed this matter in detail with industry.

Although AEC stated it did not expect to have to enter into enrichment contracts in excess of its capability, it believed that it would

be desirable to have the flexibility to do so should the need arise. If the proposed criteria were adopted, AEC would have the authority to enter into such contracts.

As GAO told the Joint Committee in 1966 when commenting on the original criteria, AEC could not, of course, commit the Congress to appropriate funds for the expansion of enrichment facilities; but, if AEC executes enrichment contracts exceeding its present capability, it must either secure future appropriations to meet its commitments or default.

AEC told GAO that it would not enter into any contract if it believed there was a significant risk of default. However, if AEC defaults, the Government might be subject to damages for a breach of contract which could be significant. (See p. 20.)

Elimination of ceiling charge

AEC is proposing to eliminate the ceiling charge in the existing criteria. When the ceiling charge was established, cost data relative to the operation of the gaseous diffusion plants was classified. AEC established the ceiling charge to provide its customers with some assurance that the price for enrichment services would not be above a certain maximum cost. (See p. 21.)

Since the ceiling charge was established, the cost associated with operating the plants have been declassified and the basis for computing the charge has been incorporated into the Atomic Energy Act. (See p. 21.) Therefore AEC stated that the purpose of including the ceiling price no longer applied.

Eliminating the ceiling charge would

not apply to customers who elect to continue to operate under requirements contracts. (See p. 22.)

#### Price differential

The proposed criteria provide AEC with the flexibility to establish more than one charge for enrichment services. (See p. 23.)

AEC announced a charge of \$38.50 a unit of separative work for all customers who elect to continue to operate under the requirements contracts and has proposed a charge of \$36 for all customers under fixed-commitment contracts. AEC's rationale for the price differential is discussed on page 23.

AEC expressed the belief that the proposed price differential would provide substantial incentive for holders of requirements contracts to convert to fixed-commitment contracts; however, AEC must honor all outstanding requirements contracts.

If AEC is unable to convince a substantial portion of its customers to convert to the fixed-commitment contracts, its objective of firming up the demand for enrichment services on the existing diffusion plants may not be fully realized.

#### Change in effective date of price increases

AEC has given its customers 180 days' advance notice of increases in the charge for separative work. The proposed criteria would provide that increases in the charges for separative work be effective upon publication in the Federal Register or such later date as the notice may specify. (See p. 24.)

The proposed notice change will

not apply to customers that elect to continue to operate under requirements contracts.

#### MATTERS FOR CONSIDERATION BY THE JOINT COMMITTEE

AEC annually provides a report to the Joint Committee on its total outstanding enrichment commitments, estimated additional commitments, and maximum enrichment capability. Because of the possibility that AEC may reach its available capability limit by the end of calendar year 1974 the Committee may wish to consider requiring that AEC report more frequently. (See p. 28.)

In addition, the Committee may wish to require AEC to include, as part of its report, information on industry's advancement toward assuming responsibility for providing any additional enrichment capability needed beyond AEC's capability. Needs for additional facilities, as well as industry's advancements toward providing for such needs, should therefore be known sufficiently in advance to enable the Congress to consider whether AEC should enter into enrichment contracts in excess of the physical capability of the existing diffusion plants. (See p. 28.)

AEC advised GAO that contingency plans were being developed as to what it would do if industry could not assume responsibility for new enrichment capacity by the end of 1974. The Committee may wish to discuss with AEC what its contingency plans call for if this situation occurs. (See p. 28.)

In addition to the matters covered in GAO's review, the report contains some suggested areas for discussion during the hearings which the Committee plans to hold on AEC's proposed revisions. (See p. 28.)

## CHAPTER 1

### INTRODUCTION

The Atomic Energy Act of 1954, as amended (42 U.S.C. 2011), authorizes the Atomic Energy Commission (AEC) to provide uranium enrichment services to domestic and foreign users. Enriched uranium is used as fuel for civilian nuclear plants and is produced in AEC's three gaseous diffusion plants at Oak Ridge, Tennessee; near Paducah, Kentucky; and near Portsmouth, Ohio.

Subsection 161v of the Atomic Energy Act of 1954, which was added by the Private Ownership of Special Nuclear Materials Act (Public Law 88-489), requires AEC to establish written criteria for the terms and conditions under which AEC would provide uranium enrichment services to domestic and foreign customers. Before AEC establishes such criteria, it must submit the proposed criteria to the Joint Committee on Atomic Energy for a 45-day period unless the Joint Committee waives, in writing, the conditions of, or all or any portion of, the period.

AEC's original criteria became effective on December 23, 1966, and were revised in 1970 and 1971. In a January 18, 1973, letter to the Chairman, Joint Committee on Atomic Energy, AEC announced proposed revisions to the criteria which would change the terms and conditions under which AEC would offer to contract to provide enrichment services.

The Chairman, Joint Committee on Atomic Energy, in a January 26, 1973, letter, asked us to review AEC's proposed revisions to the criteria. A copy of the Joint Committee's request is included as appendix I. The existing criteria, together with AEC's proposed changes to the criteria, are in appendix II. We have bracketed the proposed deletions and have shown the proposed new language in italics. The scope of our review is in chapter 3.

### URANIUM ENRICHMENT SERVICES CRITERIA

The uranium enrichment services criteria represent an implementation of Public Law 88-489 which provided for (1) the termination of mandatory Government ownership of special nuclear materials and (2) the eventual mandatory

private ownership of power reactor fuels. Private ownership avoids the necessity for a major buildup of the Government's investment in nuclear materials inventories for commercial power reactors. AEC estimated at the time of enactment of Public Law 88-489 in 1964 that, if mandatory Government ownership of nuclear fuel continued, the Government's investment in nuclear fuels in the possession of private firms for civilian power applications might have reached \$3 billion to \$4 billion by 1980.

Under this act AEC was authorized to begin uranium enrichment services January 1, 1969, under contracts with domestic licensees and under international arrangements pursuant to an agreement for cooperation entered into with another nation or with a group of nations. Contracts for these purposes, however, were authorized to be executed before January 1, 1969. As of December 31, 1972, AEC had entered into 137 contracts to provide uranium enrichment services, of which 92 were still active. During fiscal year 1972 sales of enrichment services amounted to \$154 million.

On September 21, 1967, AEC announced that the charge for uranium enrichment services would be \$26 a unit of separative work. Since that time AEC has announced three price increases

--\$28.70 a unit effective February 22, 1971,

--\$32 a unit effective September 6, 1971,<sup>1</sup> and

--\$38.50 a unit announced on February 14, 1973, to become effective on August 14, 1973.<sup>2</sup>

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<sup>1</sup>The increase was deferred until November 14, 1971, due to the Administration's wage and price freeze.

<sup>2</sup>A \$2.50 reduction in this charge is planned for those contracts executed under the proposed criteria. This price differential is discussed on p. 23.

## OBJECTIVES OF CRITERIA CHANGE

The Government and industry generally agree that additional enrichment capacity will be needed to meet the future demand for enrichment services. There are uncertainties, however, as to

--when the demand will exceed the supply and

--who the enricher will be--the Government or industry.

The objectives of AEC's proposed revisions to the uranium enrichment services criteria are to help remove these uncertainties by (1) firming up the future demand for enrichment services and (2) helping industry enter the uranium enrichment services business.

In announcing the proposed revisions to the uranium enrichment services criteria, the Chairman, AEC, mentioned that the proposed revisions were necessary to help accomplish both of these objectives when he stated that these changes:

\* \* \* are necessary to achieve more realistic and reliable planning for the supply of enrichment services, and to provide greater assurance of augmentation of available enriching capacity in the 1980's and beyond by private resources.

The changes will also improve assurance that the needed enrichment capability at the AEC's enrichment plants will be available on a timely basis.

This action by the AEC is part of a coordinated effort to assist and encourage the participation by private industry in the supply of enrichment services, the only portion of the nuclear fuel cycle not yet in the private sector.

### Supply and demand of enrichment services

AEC's three gaseous diffusion plants, when fully powered, can produce about 17.2 million units of separative work annually. With the installation of the Cascade Improvement Program (CIP) and the Cascade Upgrading Program (CUP), the annual separative work capability of the plants, when

fully powered, is expected to increase to about 27.7 million units.

Long-term demand projections for enrichment services are, in large part, based on judgments and anticipations as to the technological and economic developments in the nuclear field. By using various combinations of judgments and assumptions, the date when the demand for enrichment services will exceed the supply can vary significantly. The graph on page 9, prepared by AEC, shows that new enrichment capacity will be needed by fiscal year 1983.

Concerning the need for additional enrichment capability, an October 1972 Atomic Industrial Forum (AIF) report stated:

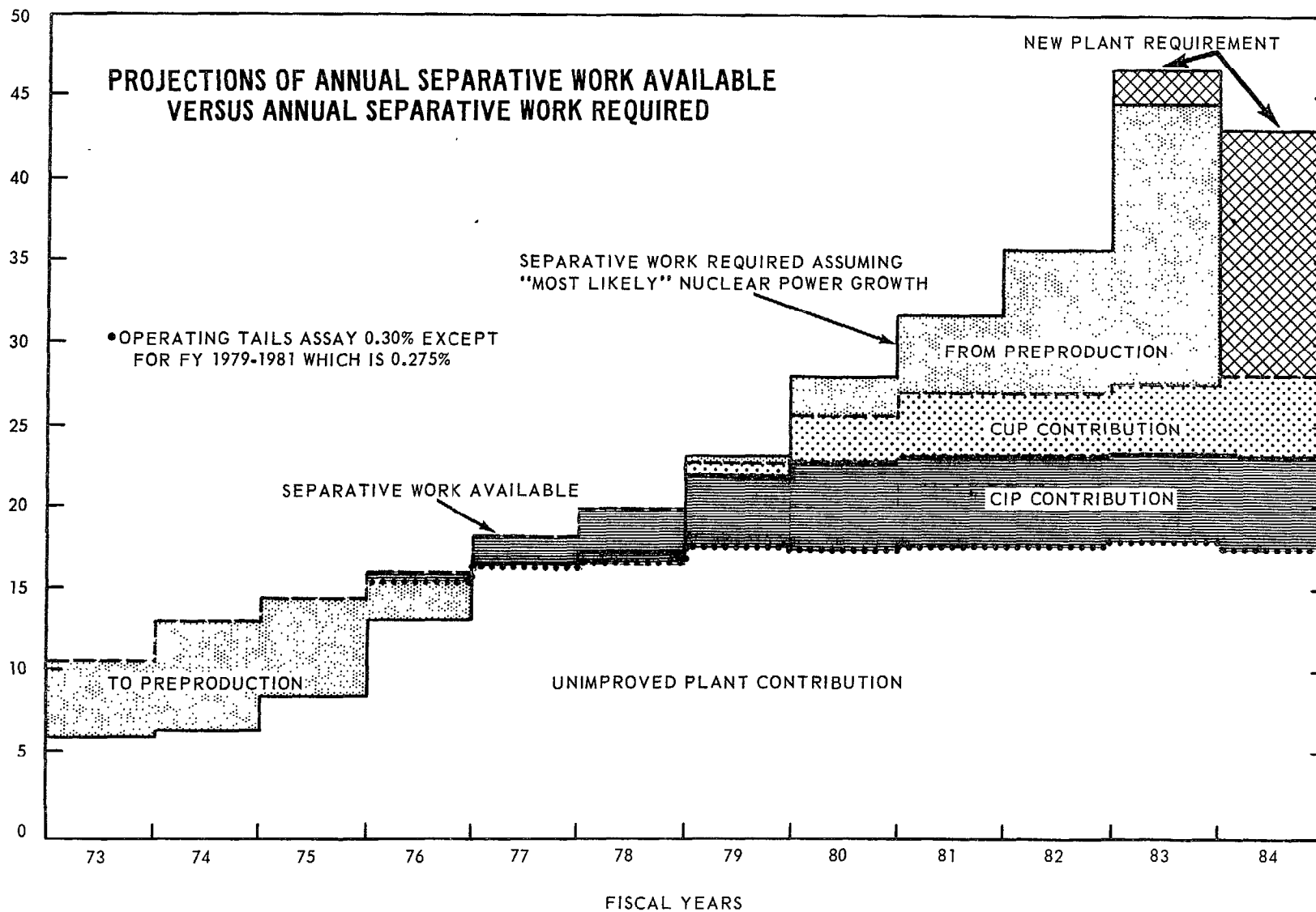
It will be necessary, if we are not to experience a separative work shortage, to bring into operation prior to the end of 1981 a new large enrichment plant (8,750 metric ton units of separative work MTSWU)<sup>[1]</sup> and another plant of the same size prior to the end of 1982. Indeed, it will be necessary prior to the end of 1985 to bring into operation new enrichment plant capacity the equivalent of the projected improved output of the three existing U.S. gaseous diffusion plants.

The number and complexity of questions involved, together with the lead time required for implementing decisions, make it imperative that plans be initiated immediately for financing, designing, constructing and operating new enrichment facilities. The Forum committee sees no way in which the unacceptable consequences of a future shortfall in separative work capacity can be avoided unless plans for the first major increment in new plant capacity are initiated before the end of 1972.

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<sup>1</sup>This is equivalent to 8.75 million separative work units annually.

SEPARATIVE WORK (IN MILLIONS OF KILOGRAM UNITS)



There is about a 2-year difference between the opinions of AEC and AIF as to when the future demand for enrichment services will exceed the enrichment capacity. The principal objective of AEC's proposed revisions to the uranium enrichment services criteria is to help remove the uncertainty of future demand by requiring its customers to firm up their initial demand for enrichment services, within minimum and maximum limits, about 8 years in advance of their expected needs. According to AEC, this approach will help firm up the date when demand will exceed available supply capability.



## Efforts to encourage industry participation

The second objective of AEC's proposed revisions to the criteria is to assist and encourage industry participation in supplying enrichment services. According to AEC a new type of contract is:

\* \* \* necessary to afford a transition towards the type of contract which private suppliers will need to secure financing for their construction of new capacity.

The private nuclear industry has developed the capabilities to provide all the materials, equipment, and services needed in the generation of nuclear electric power except uranium enrichment. On at least two occasions the President has expressed an interest in having industry assume responsibility for uranium enrichment.

In June 1971 the President stated:

The pace of the cascade improvement program will be tailored to fit the demand for enriched uranium in the U. S. and other countries \* \* \* I expect that private enterprise will eventually assume the responsibility for uranium enrichment as well, but in the meantime the government must carry out its responsibility to ensure that our enrichment capacity expands at a rate consistent with expected demand.

In March of 1972, the Chairman, AEC, advised the Joint Committee on Atomic Energy that:

The Commission believes that it is now timely to give our full encouragement to the private sector to proceed to develop plans and proposals to engage in providing commercial uranium enriching plants to be needed in the early 1980s, and beyond.

AEC in June 1971 initiated a Domestic Access Program--permitting industry to have access to classified enrichment technology--to encourage privately sponsored research and development on uranium enrichment. Also, on December 8, 1972, AEC proposed new regulations which would provide access to Government enrichment technology for use in design,

construction, and operation of facilities to provide enrichment services or to manufacture enrichment components.

Providing additional enrichment capability will necessitate the expenditure of a significant amount of money. For example, according to AEC, the construction by industry of a new enrichment plant capable of providing about 9 million units of separative work annually is estimated to cost about \$1.5 billion (1974 dollars), excluding the powerplant necessary to supply electricity for the enrichment plant.

According to AEC, before industry would make financial commitments of this magnitude, it would need assurance of a demand for the services. The Chairman, AEC, in December 1972 stated:

\* \* \* if private enterprise is to be in a position to provide the additional capacity any plant created by private enterprise will have to enter into long-term fixed quantity contracts  
\* \* \* the AEC shifting to a more business like basis for these contracts is a necessary step to provide the opportunity for the private sector to enter into the enrichment process.

In commenting on the need for AEC to change its contracting approach with users of enriched uranium, the Chairman stated:

\* \* \* The main type of contract that the AEC has offered in the past has been based on supplying the requirements of a nuclear power plant over its lifetime. Under such contracts the Commission at relatively short notice has been obligated to meet the requirements of the customer as he determines them. These contracts have resulted in placing most of the risk and responsibility on the Government as supplier.

## CHAPTER 2

### PROPOSED CHANGES IN CRITERIA AND CONTRACTS

#### FOR URANIUM ENRICHMENT SERVICES

AEC's proposed changes in the uranium enrichment services criteria provide for a number of changes in the terms and conditions under which such services will be offered. The major changes provide for:

- Eliminating references to existing contracts and establishing more general terms and conditions.
- Eliminating the restriction on AEC to offer enrichment services within available capability.
- Eliminating the ceiling charge for enrichment services.
- Establishing a provision permitting AEC to charge more than one price for enrichment services.
- Eliminating the 180-day notice for the effective date for future price increases.

AEC expects that the operating practices, to be implemented as a result of these changes, will help to remove some of the uncertainty surrounding the future demand for enrichment services. In turn these changes will provide a more realistic basis on which to (1) identify the demand on the existing diffusion plants and (2) plan for the development of new enrichment capability beyond CIP and CUP. AEC told us that it believed that it should offer its enrichment services under conditions which more nearly approach those likely to exist in industry and which would help industry enter the enrichment services business.

The proposed criteria changes are shown in appendix II. The major changes are discussed below.

#### ELIMINATING REFERENCES TO EXISTING CONTRACTS

AEC is proposing to delete all references to standard contracts in the existing criteria and is proposing that the criteria be "the general terms and conditions applicable

to the provision of uranium enrichment services" (underscoring supplied). AEC stated that it believes these changes will provide it with the appropriate flexibility it considers necessary to make such contract modifications as may be warranted through experience.

#### Existing criteria and contractual arrangements

The existing criteria provide for the use of two standard-type contracts to provide uranium enrichment services--firm quantities contracts and requirements contracts. Firm quantities contracts have generally been used for relatively small amounts delivered over a short period (generally 6 months to 1 year). The enrichment services contracted for under firm quantities contracts represented less than 10 percent of the total enrichment services AEC was obligated to provide. AEC's principal enrichment services contracts were referred to as requirements contracts which were used for providing large quantities of enrichment services over a long period.

Under a requirements contract, AEC agreed to provide the enrichment services for a stated nuclear power reactor on an "as needed" basis up to a definite limit for as long as 30 years. Under such contracts the customer is required to firm up a specific order (quantities and assay) 180 days before the desired delivery date. In practice, however, AEC has required only 120 days' advance notice.<sup>1</sup>

Under the requirements contract, AEC has assumed almost all the risks associated with both the customer (operator of the reactor) and the supplier. For example, if the reactor is delayed or shut down for an extended period, the customer is not required to obtain enrichment services during that period even though AEC is committed to provide such services should they be needed. Similarly, if the assay of U-235 enrichment or the quantity of fuel required for the initial

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<sup>1</sup>On February 14, 1973, AEC announced that it was discontinuing this practice and would now require its customers to provide 180 days' notice.

reactor core or subsequent reloads changed from that initially contemplated, the customer would be obligated to take only the U-235 enrichment and quantity actually needed.

The termination provisions under the existing requirements contracts do not appear to pose much of a burden on the enrichment customer. Since AEC began to contract for enrichment services in 1967, only one customer has terminated his contract at a charge of about \$36,500.

According to AEC, the principal reason there has been only one termination is that--should a customer's enrichment needs not materialize for any reason--the customer is not required to accept enrichment services. Also, since customers had only been required to give 120 days' firm-up notice before delivery, the possibility was remote that an enrichment customer would have to revise his requirements within this relatively short period of time.

In commenting on AEC's contracting approach, the Chairman, AEC, on December 8, 1972, stated:

This contract approach has provided flexibility to the user of the enrichment services so that long-term fuel supply considerations would not present an unnecessary deterrent to utilities considering the purchase of a nuclear power plant.

In the past, this was defensible because of the availability of excess Government capacity and because of the emergent nature of the nuclear industry. But the situation today is quite different. The industry has matured and is now growing rapidly.

The AEC is engaged in making large-scale investments in order to meet anticipated demands through about 1983. These consist of a Cascade improvement program and prospectively a Cascade uprating program which together will increase our existing plant capability by about 65 percent.

Also private industry is engaged in assessing its interest in making the large investment necessary for the next capacity expansion.

Both industry and Government need the best planning information in order to make sure that the supply will be there to meet demands. The present contracting approach just is not adequate for that purpose.

The short lead times for orders, the lack of firmness about the size and timing of future demands and short-notice contract termination are not compatible with the world in which large capacity investments are being made.

The users of these services will have to recognize more of the problems of the supplier in order to assure that nuclear fuel will be available to them in the future.

Therefore AEC is proposing to discontinue<sup>1</sup> the use of its requirements contracts and has developed the features<sup>2</sup> of a new form of contract referred to as a fixed-commitment contract.

#### Proposed criteria and contractual arrangements

The proposed criteria will enable AEC to require each customer to assume an appropriate share of the financial risks inherent in providing its enrichment needs. The proposed fixed-commitment contract places more responsibility on the enrichment customer, in terms of the advanced planning required, and requires the customer to make financial commitments before delivery.

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<sup>1</sup>On December 8, 1972, AEC announced the temporary suspension of the negotiations for entering into requirements contracts.

<sup>2</sup>As of February 1973 AEC had not developed the specific language of a fixed commitment contract although drafting was in process.

Principal differences between the requirements contracts and the proposed fixed-commitment contracts follow.

<u>Contract provisions</u>	<u>Comparison of contracts</u>	
	<u>Requirements</u>	<u>Fixed commitment</u>
Delivery leadtime for separative work requirements	120 to 180 days in advance for all deliveries	At least 8 years before initial delivery; subsequent deliveries, 10 years in advance
Downpayment	None required	Depends on reactor size--approximately \$3.3 million per 1,000 megawatts of electricity--paid in three equal annual installments
Termination provisions	<u>Zero to 5 years' notice--</u> 40 percent of separative work charge	<u>Zero to 5 years' notice--</u> about 75 percent of separative work charge
	<u>6 years' notice or more--</u> no charge	<u>6 years' notice or more--</u> about 50 percent of separative work charge
Charge for separative work <sup>1</sup>	\$38.50 a unit	\$36 a unit

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<sup>1</sup>The price differential is discussed on p. 23.

All customers holding requirements contracts will be given an option to convert to the fixed-commitment contracts. The specific features of the proposed fixed-commitment contract, together with AEC's basis for some of the quantitative factors of the new contract, are discussed in detail in appendix III.

AEC also plans to offer a short-term fixed-commitment contract (which can cover enrichment needs over a maximum of 3 years) to those customers who do not wish to enter into the extended commitment implicit in the long-term contracts. However, the short-term contracts will be subject to available capability.

Under the proposed short-term contract, a customer may not schedule the initial delivery of enrichment services more than 2 years beyond the date of execution of the contract. Conversely, AEC will not normally provide for initial delivery earlier than 6 months from the date of execution of the contract. Regardless of the date of initial delivery, subsequent deliveries cannot extend more than 3 years beyond that date. The termination provisions of the proposed short-term contract are identical to the provisions (less than 5 years) in the fixed-commitment contract.

#### CONTRACTING BEYOND AVAILABLE CAPABILITY

The existing criteria provide that AEC will offer enrichment services "subject to available capability." This language has been deleted from the proposed criteria. This deletion would permit AEC to enter into contracts for uranium enrichment services in excess of the capability of the existing diffusion plants, including the additional capability to result from CIP and CUP and from operating the plants at full power. (Unless otherwise noted, the word "capability" as used in this section of the report means the potential capability of the existing diffusion plants, including the additional capability to result from CIP and CUP and from operating the plants at full power.)

AEC believes that the phrase "subject to available capability" is difficult to interpret because of the uncertainties associated with determining the future date on which the capability of the existing diffusion plants will be exceeded. This situation results from



- uncertainties about the exact level of future customer demand under requirements contracts,
- uncertainties about the future level of plant production which will actually be achieved, and
- AEC's ability to vary future plant capability by changes in the operating tails assay.

The contractual changes AEC proposes to make (discussed on p. 16), if implemented, could result in AEC's entering into a substantial number of fixed-commitment contracts within a 1-year period. AEC expects this to happen because there are 85 nuclear powerplants, under construction or planned to be constructed, which do not have contracts with AEC for uranium enrichment services. According to AEC, in all probability, these nuclear plants will need enriched uranium in less than 8 years. Because of the proposed requirement that a customer provide AEC with at least 8 years' advance notice, these plants would not have enriched uranium when they need it. To alleviate this transitional problem, AEC plans to waive the 8-year notice requirement for these potential customers, as follows:

- Potential customers, who have contracted for nuclear plants, will be allowed a one-time 6-month period to consummate a contract for enriched uranium.
- Potential customers, who are contemplating contracting for a nuclear plant, will be allowed a one-time 1-year period to consummate a contract for enriched uranium.

AEC expects that the influx of contracts which will result from the above requirements coupled with the normal flow of regular contracts will place its gaseous diffusion plants near their capability limit by the end of calendar year 1974. AEC advised us that it believed that by the end of 1974 industry could be in a position to assume responsibility for providing any additional enrichment capability needed and all contracts beyond AEC's capability would then be consummated between the private enricher and the customer.

According to AEC, any expansion of the U.S. enrichment capability--either Government or private--which is required to meet the growing demand for nuclear fuel material should

follow the signing of contracts for the supply of such material, rather than precede it as implied by the language of the existing criteria.

An October 1972 AIF report showed it would take industry approximately 9 years to plan and construct a new enrichment facility capable of producing about 9 million units of separative work. Therefore, if a private enricher is to be able to provide enrichment capability by 1982 or 1983, it should begin consummating contracts with its customers by the end of calendar year 1974 or early in 1975.

The proposed criteria would permit AEC to contract in excess of its capability. AEC says it does not anticipate that such a situation will ever materialize because, as stated above, AEC believes that industry can assume responsibility for contracting for enrichment services in excess of AEC's capability.

AEC did not discuss in detail with industry whether it would be in a position to assume responsibility by the end of 1974 for providing new enrichment capability, that is, consummating contracts with utilities for enrichment services. AEC advised us, however, that it believed that industry could be in a position to provide enrichment services by 1982 or 1983. Because of time limitations on reporting to the Committee, we did not have an opportunity to discuss this matter with potential private enrichers to obtain their views as to the reasonableness of AEC's belief.

Although AEC stated it did not expect to have to enter into enrichment contracts in excess of the capability of the diffusion plants, it believes that it is desirable to have the flexibility to do so should the need arise. If the proposed criteria were adopted AEC would have the authority to contract to provide services in excess of its capability.

As we told the Joint Committee in our report entitled "Review of Proposed Criteria and Contracts for Uranium Enrichment Services" (B-159687, Aug. 1, 1966), AEC cannot, of course, commit the Congress to appropriate funds for expansion of enrichment facilities; but, if AEC executes enrichment contracts exceeding its present capability, it must either secure future appropriations to meet its commitments or default.

AEC told us that it would not enter into any contract if it believed there was a significant risk of default. However, if AEC defaults on meeting its commitments, the Government might be subject to damages for a breach of contract which could be significant.

#### ELIMINATING CEILING CHARGE

The existing criteria provide for a ceiling charge as follows:

Ceiling on Charge for Enrichment Services. The contract shall specify for the term of the agreement a guaranteed ceiling charge, subject to upward escalation for the cost of electric power and labor. The ceiling charge as of July 1, 1965, the base date for application of escalation, is \$30 per Kg unit [<sup>1</sup>] of separative work for separation of U-235 from U-238.

At the time the original criteria were developed, cost data relative to the operation of the gaseous diffusion plant was classified, thus, the nuclear industry was not able to evaluate the basis for AEC's charge for enrichment services. AEC established a ceiling charge to provide its customers with some assurance that the price for enrichment services would not be above a certain maximum cost.

According to AEC, the purpose of including the ceiling price in the criteria no longer applies and therefore should be deleted. This belief is based on the fact that (1) the cost basis<sup>2</sup> of AEC's charge for enrichment services has been incorporated directly into the Atomic Energy Act, (2) the

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<sup>1</sup>The ceiling charge as of January 1973 was about \$39.

<sup>2</sup>Subsection 161v of the Atomic Energy Act of 1954 was amended on December 19, 1970, by Public Law 91-560 and provides that prices for enrichment services "shall be on a basis of recovery of the Government's costs over a reasonable period of time."

costs associated with the operation of the gaseous diffusion plants are no longer classified, and (3) AEC now publishes annual financial statements on its uranium enrichment services.

Although the ceiling charge provides for escalation of costs for electric power and labor, it does not provide for increases in construction costs. Since future enrichment capability will be met with new plants, according to AEC, the unit cost of separative work from the new plants could exceed the guaranteed ceiling charge subject to escalation only for power and labor.

The elimination of the ceiling charge will not apply to customers who elect to continue to operate under requirements contracts because these contracts contain the following provision:

The charges to be paid to the Commission for enriching services provided to the Customer hereunder shall be determined in accordance with the established Commission pricing policy for such services; provided, however, that the unit charge for enriching services during the term of this agreement shall in no event exceed a ceiling charge \* \* \*

## PRICE DIFFERENTIAL

The existing criteria provide for establishing a single charge for enrichment services on the basis of recovery of the Government's cost over a reasonable period. The proposed criteria enable AEC to establish more than one charge.

At the present time AEC is proposing two charges for enrichment services--a charge of \$38.50 a unit of separative work for all customers who elect to continue to operate under the requirements contracts and a charge of \$36 a unit for all customers under fixed-commitment contracts.

AEC's rationale for the price differential is as follows:

- Past experience has shown that actual sales have fallen about 10 percent short of projected sales under requirements contracts.
- Fixed costs of production (75 percent of total costs) allocable to the 10-percent slippage have not been recovered and must be recovered from future sales.
- Fixed-commitment contracts should not have to assume the fixed costs allocable to the 10-percent slippage since the slippage results under requirements contracts; therefore, the cost per unit of separative work should be higher for requirements contracts.

According to AEC the proposed price differential will provide substantial incentive for holders of requirements contracts to convert to fixed-commitment contracts; however, AEC must honor all outstanding requirements contracts.

As of December 1972 there were 84 requirements contracts in effect. According to AEC, it will take about 40 percent of the enrichment capability of the diffusion plants, including the additional capability to result from CIP and CUP, to fulfill these contracts. The principal objective of AEC's proposed changes to the criteria is to firm up the demand for enrichment services. According to AEC, to fully accomplish this objective, as it relates to the existing diffusion plants, customers holding requirements contracts must convert to fixed-commitment contracts. If AEC is unable to convince a substantial part of its customers

to convert to the fixed-commitment contracts, it may not fully realize its objective.

Assuming a normal annual fuel reload of 124,000 separative work units,<sup>1</sup> the impact of the price differential on the operating cost of a customer who elects not to convert to the fixed-commitment contract can be computed as follows:

124,000 units x \$38.50 =	\$4,774,000
124,000 units x \$36.00 =	<u>4,464,000</u>

Increase in annual operating cost	<u>\$ 310,000</u>
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AEC has estimated that the annual operating cost of a reactor having an annual requirement of 124,000 units of separative work would be about \$70 million. Therefore a customer electing not to convert to a fixed-commitment contract would increase his annual operating costs by about 0.4 percent.

#### CHANGE IN EFFECTIVE DATE OF PRICE INCREASES

The existing criteria state that:

\* \* \* any increase in the charge per unit of separative work for enriching services shall require at least 180 days' notice to the customer by publication in the Federal Register.

The proposed criteria would delete this notification provision and provide instead:

Any increase in the charges per unit of separative work for enriching services shall become effective upon publication in the Federal Register or such later date as the notice may specify.

In justifying this change, AEC stated it was not ordinary commercial practice to give lengthy notice for price increases. AEC further stated that payment for enrichment

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<sup>1</sup>According to AEC, this represents a normal fuel reload for a 1,000 MWE pressurized water nuclear power reactor.

services is not due until 30 days after billing and that this should provide sufficient time for the customer to obtain the necessary resources to meet any price increase.

The proposed change will not apply to customers that elect to continue to operate under requirements contracts because these contracts contain the following provision:

It is recognized that the Commission may, from time to time during the term of this agreement, either increase or decrease its unit charge for enriching services. Any increase in such charge shall require at least 180 days' notice to the Customer, by publication in the Federal Register or otherwise.

## CONCLUSION

The principal objective of AEC's proposed revision to the uranium enrichment services criteria is to firm up the demand for enrichment services to achieve more realistic and reliable planning for the supply of such services. The second objective of the proposed changes is to assist and encourage industry to participate in the supply of enrichment services needed beyond the additional capability to result from CIP and CUP.

We see no legal objection to the proposed criteria changes and the corresponding changes AEC is contemplating in its contractual relationship with its customers. AEC's objectives seem reasonable because of the uncertainties about the level of future customer demand for enrichment services and the substantial financial commitments necessary to provide additional enrichment capability. We believe that the proposed changes provide AEC with the flexibility to initiate operating practices which should be helpful in accomplishing its objectives. In the final analysis, however, AEC's ability to fully accomplish its objectives will depend on future events which cannot be predicted.

For example, AEC's ability to firm up the demand on the existing diffusion plants is largely contingent on its ability to convince customers with requirements contracts to convert to fixed-commitment contracts. AEC believes that utilities under existing requirements contracts will be substantially motivated by the price differential (\$2.50 per unit of separative work) to convert to the new fixed-commitment contract. However, some utilities may decide that the benefits of the requirements contracts (e.g., maintaining a ceiling price and more favorable termination provisions) outweigh the risks and lower price associated with the fixed-commitment contract.

Concerning the objective of encouraging the participation of private industry in the supply of enrichment services, in our opinion, a number of factors, other than contractual arrangements with its customers, will influence the decision of a private enricher to enter the enrichment services business. Such factors include (1) the possibility of Government regulation, (2) the development of foreign competition, and (3) the economic feasibility of the gas centrifuge process.



The gas centrifuge process is an alternative isotope separation process. According to AEC, however, further developmental work on this process is necessary to determine whether the process is economically competitive with the gaseous diffusion process.

The principal advantage of the gas centrifuge process is that the power cost (which represents about 50 percent of the cost of separative work in the gaseous diffusion plants) represents less than 10 percent of the cost of separative work. AIF estimates that the unit cost of separative work from a gas centrifuge plant would be about \$5 less a unit than the cost from a gaseous diffusion plant. Therefore the technological achievements in the gas centrifuge program may affect a private enricher's willingness to build a gaseous diffusion plant.

MATTERS FOR CONSIDERATION  
BY THE JOINT COMMITTEE

AEC annually provides a report to the Joint Committee on its total outstanding enrichment commitments, estimated additional commitments, and maximum enrichment capability. Because of the possibility that AEC may reach its available capability limit by the end of calendar year 1974 (see p. 19) the Committee may wish to consider placing more frequent reporting requirements on AEC for this information.

In addition, the Committee may wish to require AEC to include, as part of its report, information on industry's advancement toward assuming responsibility for providing any additional enrichment capability needed beyond AEC's capability. Needs for additional facilities, as well as industry's advancements toward providing for such needs, should therefore be known sufficiently in advance to enable the Congress to consider whether AEC should enter into contracts in excess of the physical capability of the existing diffusion plants.

AEC advised us that contingency plans were being developed as to what it would do if industry was not able to assume responsibility for providing new enrichment capacity by the end of 1974. The Committee may wish to discuss with AEC what its contingency plans call for if this situation occurs.

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Following are a number of matters which, because of time limitations, we did not include in our review but which the Joint Committee on Atomic Energy may wish to discuss with industry during the hearings it plans to conduct early in March 1973 to obtain a better understanding of the problems which might confront these groups as a result of the proposed revisions.

- The utilities' willingness to sign a fixed-commitment contract with AEC or a potential private supplier.

- The likelihood that a potential supplier of enrichment services will be able to consummate enrichment contracts with utilities by the end of calendar year 1974, at which time AEC expects the supplier to be willing to assume this responsibility.
- The price range for separative work that could be expected from a new plant.
- The potential suppliers' opinion of the adequacy of the proposed fixed-commitment contract as it relates to the commitments which utilities must make.
- Potential problems arising from the possibility of different charges for separative work between the Government and industry.

## CHAPTER 3

### SCOPE OF REVIEW

We made our review at AEC Headquarters, Germantown, Maryland, to (1) ascertain the legality of the proposed revisions to the criteria and (2) compare the existing criteria with the proposed criteria. Because of the time limitations for reporting to the Committee, we did not have an opportunity to discuss the impact of AEC's proposed changes with industry.

We reviewed the legislative history of the Private Ownership of Special Nuclear Materials Act (Public Law 88-489). In addition, we obtained the views of AEC personnel knowledgeable of, and responsible for, operation of the diffusion plants.

We reviewed AEC's rationale for the different prices per unit of separative work proposed to be charged to customers under requirements contracts and fixed-commitment contracts. Because of the time limit, we did not verify the accuracy of data used to support the calculation.

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# Congress of the United States

## JOINT COMMITTEE ON ATOMIC ENERGY

WASHINGTON, D.C. 20510

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January 26, 1973

The Honorable Elmer B. Staats  
Comptroller General of the  
United States  
Washington, D. C. 20016

Dear Mr. Staats:

By letter dated January 18, 1973, the AEC submitted to the Joint Committee on Atomic Energy proposed revisions to the criteria under which it would provide uranium enrichment services. The Atomic Energy Act of 1954, as amended, requires in general that such revisions lie before the Committee for 45 days while Congress is in session before becoming effective.

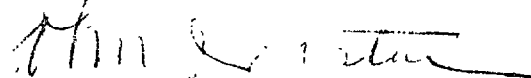
The proposed revisions to the criteria relate to the contracting approach for uranium enrichment services. According to AEC, the changes are necessary to achieve more realistic and reliable planning for the supply of enrichment services.

In view of the substantive nature of the proposed revisions to the criteria and their importance to the Government, the nuclear industry, and the general public, the Committee plans to conduct hearings on the matter early in March 1973.

Accordingly, the Committee would like the General Accounting Office to review the proposed revisions and provide us with a report thereon. To be of maximum benefit to the Committee, this report should be made available to us before the end of February.

Your assistance in this important matter is greatly appreciated.

Sincerely yours,



John O. Pastore  
Chairman

URANIUM ENRICHMENT SERVICES CRITERIA<sup>1</sup>

## 1. General

(a) The United States Atomic Energy Commission (AEC) hereby gives notice of the establishment of criteria setting forth the *general* terms and conditions [under which it offers, subject to available capability, to provide] *applicable to the provision of* uranium enrichment services in facilities owned by AEC, as authorized by the Atomic Energy Act of 1954, as amended (the Act). Specifically, these criteria are established pursuant to section 161v of the Act, which was added by Public Law 88-489, the "Private Ownership of Special Nuclear Materials Act." As used in this notice, the term "enrichment services" or "enriching services" means the separative work\* necessary to enrich or further enrich uranium in the isotope 235. The enrichment services [shall] *will* be provided pursuant to contracts to be entered into (1) with persons licensed under section 53, 63, 103, or 104 of the Act, and/or (2) in accordance with agreements for cooperation arranged pursuant to section 123 of the Act. '

(b) The contracts will provide for the furnishing of depleted, normal or enriched uranium by the customer and the delivery by the AEC of an appropriate quantity of enriched or more highly enriched uranium. The quantity of material to be furnished by the customer in relationship to the quantity of enriched uranium to be delivered by the AEC and the related amount of separative work to be performed by the AEC normally will be determined in accordance with the then-current standard table of enriching services published by the AEC.\*\* In the event, however, that the AEC does not have available capability to undertake to perform requested enriching services on short notice in accordance with such standard table, the AEC may agree to perform such services in accordance with such other table as is within its capability. The general features of [standard] contracts, including the basis for AEC's charges for enriching services, are set forth herein.

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\* The work devoted to separating a quantity of uranium (feed material) into two fractions, one a Product fraction containing a higher concentration of U-235 than the Feed and the other a Tails fraction containing a lower concentration of U-235.

[\*\*The initial table, as presently contemplated, will not provide to the customer flexibility to select a quantity of feed and an amount of separative work other than those specified in the AEC table. However, the AEC is giving further study to the question of providing, at some date in the future, a form of contract under which flexibility would be available.]

\*\* *In its standard table of enriching services AEC will take into account any significant effect of the presence of other isotopes of uranium on the number of separative work units required to perform a given U-235, U-238 separation.*

<sup>1</sup>Brackets indicate deletions.

Script type indicates additions to the criteria.

(c) Except as specifically provided, nothing in this notice shall be deemed to affect the sale or leasing of special nuclear material by the AEC or the entering into of "barter" arrangements whereby special nuclear material is distributed pursuant to section 54 of the Act and source material is accepted in part payment therefor. [Neither the execution of an agreement for the furnishing of uranium enrichment services nor the termination or expiration of such agreement will in itself alter or affect any rights and obligations of any AEC licensee under its license or construction permit other than those regarding any allocation of special nuclear material in connection therewith.\*]

(d) The criteria contained in this notice are subject to change by the AEC from time to time; however, any such changes shall be submitted to the Joint Committee on Atomic Energy for its review in accordance with the Act.

2. Effective Date. This notice is effective upon publication in the Federal Register.

3. Period of Contract. Contracts with domestic licensees will be for specified periods of time *and provide for the furnishing of enrichment services for periods* up to 30 years. Contracts entered into in accordance with an international agreement for cooperation must be for a term within the period of such agreement. [In either case, contracts may be entered into at any time after the effective date of this notice; however, no such contract shall provide for delivery of special nuclear material by AEC or delivery of uranium feed material to AEC before January 1, 1969.]

4. Enrichment of Uranium of Foreign Origin. There is no restriction on the provision of enrichment services to persons furnishing as feed material uranium of foreign origin where the enriched product is not intended to be used in a utilization facility (as defined in the Act) within or under the jurisdiction of the United States. Where the enriched material is intended to be used in a domestic utilization facility, however, the [standard] contracts will prohibit the furnishing of feed material of foreign origin. This prohibition is established, pursuant to section 161v of the Act, in order to assure the maintenance of a viable domestic uranium industry. From time to time, the AEC will review the condition of the domestic mining and milling industry to determine the need for continuing this restriction, modification or removal of which shall constitute a change in these criteria.

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[\*In view of the authority granted to the AEC under the Act to execute long-term fuel supply agreements, the AEC is reviewing its existing regulations and procedures with respect to the need for allocations of special nuclear material in licenses.]

## APPENDIX II

5. General Features of [Standard] Domestic Contracts. [The following types of] *Domestic* contracts have been developed in the light of the uncertainties necessarily attendant to *long-term* contracts. [which may be for periods as great as 30 years.] Accordingly such contracts will provide that, at the request of either the AEC or the customer, the parties will negotiate and, to the extent mutually agreed, amend them, without additional consideration, in a manner consistent with the criteria then established by the Commission in accordance with the requirements of section 161v of the Act to eliminate or reduce restrictive provisions which the parties determine are inequitable, discriminatory or no longer required to protect their interests. [The AEC will use two standard types of uranium enrichment] Contracts to be entered into with domestic licensees [. These are entitled (a) "Agreement for Furnishing Uranium Enrichment Services (Domestic Customers - Firm Quantities)," and (b) "Agreement for Furnishing Uranium Enrichment Services (Domestic Customer's Requirements)." The AEC may also offer a uranium enrichment contract combining features of the foregoing types of contract. The type of contract first mentioned, at the customer's option, will either (i) define the specific quantities and assays of enriched uranium to be delivered to the customer, the schedule for such deliveries, and the quantity and assay (or a range of quantities and assays within permitted amounts) of feed material other than natural uranium to be delivered by the customer, with the remainder of the required feed material to be delivered as natural uranium, or (ii)] *will* define the amount of enriching services to be [performed] *provided* by the AEC in terms of units of separative work as related to the AEC's standard table of enriching services in effect at the time the parties agree to such amounts and provide for the adjustment of such amounts in the event of a revision of the AEC's standard table of enriching services through the application of such revised standard table to the relevant portion of a reference schedule of feed material deliveries by the customer and enriched uranium deliveries by the AEC incorporated into the contract for this purpose. [The second type would provide for the furnishing of part or all of the customer's requirements for enriching services for a designated facility or facilities during the term of the contract.]

[In addition to the items discussed above, the more significant provisions of the standard domestic contracts are summarized below:]

(a) Delivery Schedules. Deliveries of specific quantities and U-235 assays of feed material to AEC and enriched uranium to the customer shall be in accordance with the agreement between the parties and (except as provided in 1(b) above) in accordance with the published AEC standard table of enriching services in effect at the time of the delivery of enriched uranium by the AEC. The schedule for delivering enriched uranium to the customer shall reflect an interval after receipt of feed material equivalent to the estimated average time which would be required to receive, handle, and process equivalent feed material to the desired enriched uranium. The AEC will not necessarily use the specific feed



material furnished by the customer in producing the enriched uranium delivered to the customer. Unless otherwise agreed, deliveries of feed material to AEC shall precede requested deliveries of the enriched uranium by at least ninety (90) days. The AEC may agree to perform enriching services in cases where the lead time requirements for furnishing feed material are not satisfied; in such cases, an appropriate surcharge may also be imposed to provide for recovery of additional AEC costs and interest charges.

(b) Chemical Form and Specifications of Material. Both feed material furnished to the AEC and enriched uranium delivered to the customer are required to be in the form of  $UF_6$  and conform to the AEC's established specifications as published in the Federal Register and in effect on the date of delivery.

(c) Charges for Enriching Services.

(1) The charges for enriching services, in accordance with the Act, will be established on a nondiscriminatory basis and on a basis of recovery of the Government's costs over a reasonable period of time. Applicable charges for enriching services and related services will be those in effect at the time of delivery of enriched uranium to the customer as (i) published in the Federal Register, or (ii) in the absence of such publication, determined in accordance with the Commission's pricing policy. [The charge per unit of separative work for enriching services will be the same as that employed in the Commission's published schedule of charges for sale or lease of enriched uranium.] The AEC may impose an appropriate surcharge representing additional costs, if any, to the AEC for providing enriching services on short notice.

(2) AEC's charges for enriching services will be established on a basis that will assure the recovery of appropriate Government costs projected over a reasonable period of time. The cost of separative work includes electric power and all other costs, direct and indirect, of operating the [gaseous diffusion] *enrichment* plants; appropriate depreciation of said plants; and a factor to cover applicable costs of process development, AEC administration and other Government support functions, and imputed interest on investment in plant and working capital. During the early period of growth of nuclear power, there will be only a small civilian demand on the large AEC [diffusion] *enrichment* plants. These plants were originally constructed for national security purposes, but will be utilized in meeting future civilian requirements. In this interim period of low plant utilization, the Commission has determined that the costs to be charged to the separative work produced for civilian customers will exclude those portions of the costs attributable to depreciation and interest on plant investment which are properly allocable to plant in standby and to excess capacity.

## APPENDIX II

(3) Projections of supply and demand over a reasonable time period will be used in establishing a plan for [diffusion] *enrichment* plant operations. This plan will be the basis for establishing an average charge for separative work over the period involved, which charge will be kept as stable as possible as operating plans are periodically updated. Under such operating plans, AEC will at times be preproducing enriched uranium. Interest on the separative work costs of any such preproduced inventories will be factored into the average separative work charges.

[(d) Ceiling on Charge for Enrichment Services. The contract shall specify for the term of the agreement a guaranteed ceiling charge, subject to upward escalation for the cost of electric power and labor. The ceiling charge as of July 1, 1965, the base date for application of escalation, is \$30 per Kg unit of separative work for separation of U-235 from U-238. (In its standard table of enriching services, as well as its schedule of charges for sale or lease of enriched uranium, AEC will take into account any significant effect of the presence of other isotopes of uranium on the number of separative work units required to perform a given U-235, U-238 separation.)]

[(e)] (d) Customer's Option to Acquire Tails Material. The customer shall be granted an option to acquire tails material (depleted uranium) resulting from the performance of enriching services. The option as to quantity (Kg U) of tails material desired by the customer, within the maximum quantity subject to the option, must be exercised at the time of delivery of the related quantity of feed material. The U-235 assay of the tails material delivered to the customer will be within the sole discretion of the AEC. The maximum quantity of depleted uranium subject to the option will be equal to the difference between the total uranium supplied by the customer as feed material and the total enriched uranium furnished to the customer, less processing losses as established from time to time by the AEC. No charge will be made for tails material delivered to the customer under the agreement other than AEC's withdrawal, handling and packaging charges. Delivery of tails material will normally be at the same time as delivery of enriched uranium.

[(f)] (e) Responsibility for Material Meeting Specifications. The customer warrants that all feed material meets specifications and, with stated exceptions, agrees to hold the AEC and its representatives harmless from all damages, liabilities, or costs arising out of a breach of the warranty where such damages, liabilities, or costs are incurred prior to final acceptance of the feed material by AEC. However, the customer is not deprived of any rights under indemnification agreements entered into pursuant to section 170 of the Act (Price-Anderson indemnification). The AEC's obligation to furnish specification material to the customer terminates upon final acceptance of such material by the customer.

## [(g)] (f) Termination by AEC.

(1). The contract may be terminated by AEC without cost to AEC upon reasonable notice at such time as commercial enriching services are provided by another domestic source; provided, however, that AEC will upon request by the customer rescind any notice of termination and will continue to furnish the services specified in the contract if the services of the domestic source are not available to the customer: (i) to the extent provided for in the AEC contract during the remainder of its term[;] and (ii) on terms and conditions, *including charges*, which are considered by the AEC to be reasonable. [and nondiscriminatory as between domestic and foreign customers; and (iii) at charges considered by AEC to be reasonable, nondiscriminatory, and no higher than the ceiling charge under the AEC contract, as escalated for the cost of electric power and labor.]

(2) The AEC may terminate the contract without cost to the AEC in the event the customer loses its right to possess enriched uranium, defaults on its contractual obligations, or becomes involved in bankruptcy proceedings. In such instances the customer will be required to pay a termination charge determined as if the customer had terminated the contract on the notice, if any, given the customer by the AEC.

[(h)] (g) Termination by Customer. The customer may terminate the contract in whole or in part. In such instances the customer will be required to pay a termination charge for those enriching services which would have been furnished but for such termination. [No termination charges shall apply to amounts of separative work which would have been furnished at times 5 years or more subsequent to the date of receipt of the notice of termination of such amounts. The termination charge shall apply to each unit of separative work that would have been furnished but for such termination and for which 5 years' advance notice was not given, and shall be equal to 40 percent of the charge per unit of separative work. The units of separative work and enriching services charges applicable to the enriching services terminated shall be determined in accordance with the established Commission standard table of enriching services and established charges for enriching services which, on the date of the receipt of the notice of termination, are in effect and/or are to become effective within 180 days after receipt of the notice of termination. From time to time, the Commission may, at its discretion, review the estimated costs to the Commission which may arise from terminations by customers. If the Commission determines on the basis of such review that the estimated costs are significantly less than the termination charges specified herein, the Commission will make an appropriate reduction in such charges prospectively. Such reduced charge will remain in effect until increased or reduced by a subsequent review and determination (based upon significant changes in the estimated costs as compared with the termination charge then in effect).]

## APPENDIX II

In no case, however, will any revised charge so determined exceed 40 percent of the charge per unit of separative work. Any revised charges so determined shall be final for all purposes except as they may be changed by subsequent determinations made in accordance herewith. Upon the request of the customer prior to its delivery of a notice of termination, the AEC will advise the customer of the approximate amount of termination charges which would be payable.] *The termination charges will be established on a basis of recovery of the costs which the Commission estimates may arise from terminations by customers. Applicable charges for termination will be those in effect at the time of receipt of notice of termination as published in the Federal Register.*

[(i)] (h) Delivery - Title. The f.o.b. delivery point for both feed material furnished to AEC and enriched uranium delivered to the customer is the designated AEC facility. The AEC's enriching facilities are situated at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. Title to all material passes upon delivery.

[(j)] (i) Changes in Specifications and Charges. [and Specifications.] Any change made [after July 1, 1968,] in the specification for  $UF_6$  [,] or in the AEC's standard table of enriching services, [or any increase in the charge per unit of separative work for enriching services] shall require at least 180 days' notice to the customer by publication in the Federal Register. *Any increase in the charges per unit of separative work for enriching services shall become effective upon publication in the Federal Register or such later date as the notice may specify.*

[(k)] Customer's Requirements Contracts. In addition, requirements contracts will provide:]

[(1) Quantities and Enrichments of Material. The customer will be committed to obtain, and the Commission to provide, part or all of the customer's actual requirements for enriching services for a designated facility or facilities during the term of the agreement. Timely notice of the customer's requirements must be furnished to AEC. Except as provided in 1(b) above the quantities and enrichments of feed material furnished by the customer will be those required, in accordance with the published AEC standard table of enriching services, to obtain the material of higher enrichment desired by the customer. A maximum net amount of enriching services to be provided will be established.]

[(2) Utilization of Material. The contract will provide the basis for determining the portion of the customer's requirements for enriching services to be furnished by the AEC by describing the extent to which:

- a. enriched uranium furnished by the AEC under the contract will, after being used in or in support of the operation of the designated facilities, be recycled or delivered to the AEC as feed material under the contract;

- b. plutonium or U-233 produced in and discharged from the designated facilities will be recycled for use in or in support of the operation of the designated facilities;
- c. special nuclear material obtained from sources other than through the contract or the operation of the designated facilities, will be used in or in support of the operation of the designated facilities, including delivery of such material to the AEC as feed material under the contract.

Where the contract does not initially provide for the recycle for use, as in b. above, of the plutonium or U-233 produced, the customer, at any time prior to June 30, 1973, or such later date as the AEC may establish for this purpose, may elect, without incurring termination charges, to so use such plutonium or U-233 thereafter. In such cases, the contract will also provide for use of plutonium or U-233, as the case may be, from another source in lieu of such produced material. The customer may further change such utilization of material by agreement or by terminating the contract in whole or in part.]

6. General Features of Contracts Entered into in Accordance with an Agreement for Cooperation. It is expected that the general features of uranium enrichment services contracts entered into pursuant to agreements for cooperation with foreign nations or groups of nations will be generally consistent with those discussed above.

7. Correspondence. Any correspondence involving this notice or request for copies of contract forms should be addressed to:

Manager, Oak Ridge Operations Office  
 United States Atomic Energy Commission, Post Office Box E,  
 Oak Ridge, Tennessee 37830

## APPENDIX III

### SUPPLEMENTAL INFORMATION ON

#### SELECTED PROVISIONS OF FIXED-COMMITMENT CONTRACTS

##### PROVISIONS OF LONG-TERM FIXED-COMMITMENT CONTRACTS

AEC's contracting approach under its proposed fixed-commitment contracts involves two phases. Phase I represents the period of time between the signing of the contract (which must be at least 8 years before the customer needs enriched uranium) and the time the customer places his order for the nuclear reactor with the reactor manufacturer. Phase II of the fixed-commitment contract begins within 6 months after the customer places his order with the reactor manufacturer and continues until the first reactor core (first fuel load) is delivered. Beginning with the first delivery for the first core, the fixed-commitment contract functions on a 10-year "rolling" period; i.e., the customer must firm up his requirements 10 years in advance of the date such requirements will be needed.

Following is a description of what the customer does, or agrees to do, under the two phases of a fixed-commitment contract.

##### PHASE I

(8 years before the first delivery for the first core)

The customer must:

1. Execute enrichment contract.
2. Specify year in which first reactor core will be needed.
3. Specify a certain reactor size range (e.g., 700 to 899 MWE, 900-1099 MWE, or greater than 1100 MWE).
4. Agree to firm up within 6 months after ordering his reactor (a) the quantities of enriched uranium to be delivered under the contract for the first core (within maximum and minimum limits) and (b) the

succeeding 9 years' requirements after the delivery of the first core.

5. On succeeding 9 years' requirements, the customer must agree to (a) specify, as a minimum, firm quantities equal to twice the amount of the quantities for the first core and (b) specify, as a maximum, firm quantities equal to its total estimated requirements.
6. Make an initial downpayment at the time of contract signing which would be approximately \$1.1 million for a 1000 MWE plant (two additional downpayments of \$1.1 million each are required the first and second years after contract signing). Unless the customer subsequently terminates his contract, these downpayments will be applied toward the charge for the first core.

#### PHASE II

(within 6 months after reactor order is placed with reactor manufacturer)

The customer must:

1. Specify the estimated date he will receive the construction permit for his reactor.
2. Firm up (a) the date and quantities to be delivered under the contract for the first core within the minimum and maximum limits in 4 above and (b) the quantities required for reloads for the succeeding 9 years as specified in 5 above.
3. Agree to take the first reactor core as originally specified in phase I even if his construction permit is delayed. (However, the customer can annually defer the scheduled deliveries for the succeeding 9 years for each year's delay in receipt of the construction permit from the date originally estimated in the contract.)

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4. On issuance of his construction permit, the customer is subject to termination charges if termination notice is not given to AEC at least 10 years in advance. The resulting termination charges are expected to be about (a) 75 percent of the charges for separative work for termination notices effective within 5 years and (b) 50 percent of the charges for separative work for termination notices effective between 5 and 10 years. In the event of the termination, downpayments (see 6 above) are applied to the termination charges.

On delivery of the first reactor core, the customer must firm up his requirements for the 10th year following the delivery of the first core. (The customer has already firmed up 9 years of requirements in step 2 above.) The firm-up period of 10 years then begins to roll, i.e., with each succeeding year the customer must firm up an additional year's requirements thus, at any point in time, he will have firmed up his requirements for a 10-year period.

### REACTOR CORE DOWNPAYMENT

The purpose of the downpayment is to require the customer to make a financial commitment in support of his order.

Some features of the downpayment are:

1. AEC is currently considering requiring a downpayment on the basis of the expected range of the reactor size, e.g., less than 700 MWE, 700-899 MWE, 900-1099 MWE, greater than 1100 MWE.
2. For the 900 to 1099 MWE range, the total downpayment has been established at \$3.3 million.
3. The downpayment will vary by about \$660,000 for each different MWE range.
4. The downpayment required for the initial core loading represents about 25 to 40 percent of the cost of separative work for a first core.



5. The downpayment is to be credited against the cost of the initial core or against the cost of termination, should such termination occur after receipt of a construction permit. Should termination occur before the receipt of a construction permit, the downpayment is forfeited.
6. The downpayment is to be paid in three equal annual installments beginning when the contract is signed.

#### FIRM-UP SCHEDULE

AEC selected a minimum 8-year period between contract execution and the first delivery applicable to the first reactor core because this period represents the estimated leadtime it will take to provide additional enrichment capability.

The 10-year rolling firm-up period was selected by AEC as representing a reasonable period over which to guarantee a market to a potential supplier of enrichment services, without placing undue planning hardships on the enrichment customers.